Surface Temperature Distribution of an Improved Cook Stove

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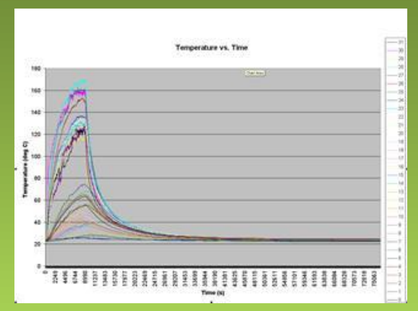


ABSTRACT

The purpose of this project was to test a wood cookstove to see what its surface temperatures are and determine how effective it may be for cooking. This research is important because billions of people living in the developing countries of the world use this method of cooking their food. If a more effective stove can be developed, some of the hazards of this kind of cooking can be eliminated.

BACKGROUND

Cooking on woodstoves has long been associated with two major problems: a. deforestation, and b. safety.

Deforestation - It is an established fact that vast areas of woodland in developing countries have been deforested. For countries at the fringe of a desert, this situation has led, and will lead to an irreversible decrease of the area available for a productive ecosystem. A variety of actions have been proposed in order to ease the pressure on woodlands. Improved agriculture habits, improved forest management, reforestation, fuel switching, and improved wood stoves all play a role.

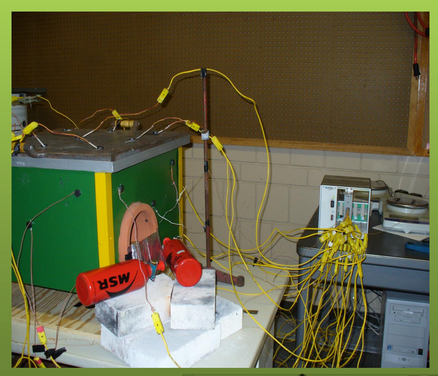
Safety - Every wood stove produces carbon monoxide. Release of the combustion products in a kitchen or an enclosed space will lead to a buildup of the carbon monoxide concentration. Depending on the carbon monoxide production of the stove, kitchen volume and air exchange rate, carbon monoxide concentrations can be reached that will affect the user's health. Additionally, two other major hazards associated with the use of these stoves is the possibility of receiving severe burns and inhalation of smoke.

METHODS

We used thirty thermocouples to measure the temperature of various surfaces of the stove.

One of the issues we faced from the beginning was figuring out exactly where to place the thermocouples and how to attach them to the stove body. We were able to overcome the first problem by each submitting a diagram of where we would place the probes. Using the process of collaboration, we decided on where the thirty probes would be placed.

The next problem was finding a way to attach the thermocouples to the stove. The first thing that we tried was a semi-liquid mortar. This did not work on the heating surface of the stove. Since the outer surface of the stove is made of metal, we decided to use small magnets that had a very strong magnetic field.



RESULTS

The results that we received were consistent with what we expected to occur, that is, the top surface of the stove would transfer more heat than the rest of the stove. This was true. This can be seen by looking at the percentage of the total heat transferred through the thermocouples numbered 20 - 28. We also graphed the results to better ascertain how quickly and how slowly each area of the stove was heated and cooled (Chart #1). Based on these observations, it appears the greatest amount of heat was transferred through the top surface of the stove and most of the other surfaces of the stove were safe to touch.

REFERENCES

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Acknowledgement

I want to expressly thank the following people and organizations for making this research opportunity possible. The DOE Office of Science for funding. Ames Laboratory for hosting the ACTS program. Mentors, Mark Bryden/Penn Taylor Iowa State Univ. Dept. of Mechanical Engineering